

Name: Solutions

Factoring Trinomials with $a \neq 1$

1. Factor $3x^2 - 11x - 4$ $= (3x + 1)(x - 4)$

2. Factor $5y^2 + 12y + 7$ $= (5y + 7)(y + 1)$

3. Factor $14t^2 + 11t - 15$ $= (2t + 3)(7t - 5)$

Factoring Binomials that are Difference of Squares

4. Factor $x^2 - 25$ $= (x - 5)(x + 5)$

5. Factor $m^2 - 36$ $= (m - 6)(m + 6)$

6. Factor $9k^2 - 49$ $= (3k - 7)(3k + 7)$

Factoring Trinomials that are Binomials Squared

7. Factor $x^2 + 4x + 4 = (x+2)(x+2) = (x+2)^2$

8. Factor $n^2 + 8n + 16 = (n+4)(n+4) = (n+4)^2$

9. Factor $p^2 - 20p + 100 = (p-10)(p-10) = (p-10)^2$

10. Factor $4w^2 + 20w + 25 = (2w+5)(2w+5) = (2w+5)^2$

Factoring Binomials that are a Difference of Cubes or a Sum of Cubes

11. Factor $x^3 - y^3 = (x-y)(x^2 + xy + y^2)$

12. Factor $m^3 - 64 = (m-4)(m^2 + 4m + 16)$

13. Factor $8k^3 - 27 = (2k-3)(4k^2 + 6k + 9)$

14. Factor $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$

15. Factor $t^3 + 64 = (t + 4)(t^2 - 4t + 16)$

Factoring Binomials with a Common Factor

16. Factor $mx + 3m = m(x + 3)$

17. Factor $2ry^2 + 50r = 2r(y^2 + 25)$

18. Factor $8x^2 - 24x = 8x(x - 3)$

19. Factor $5m^3 - 45m = 5m(m^2 - 9) = 5m(m - 3)(m + 3)$

Factoring Trinomials with a Common Factor

$$20. \text{ Factor } 2x^2 + 10x + 12 = 2(x^2 + 5x + 6) = 2(x+2)(x+3)$$

$$21. \text{ Factor } 3y^3 + 6y^2 - 45y = 3y(y^2 + 2y - 15) = 3y(y+5)(y-3)$$

$$22. \text{ Factor } 4n^4 - 20n^3 - 56n^2 = 4n^2(n^2 - 5n - 14) = 4n^2(n-7)(n+2)$$

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Factoring Higher Degree Polynomials by Grouping

$$\begin{aligned} 23. \text{ Factor } x^3 + 5x^2 + 4x + 20 &= (x^3 + 5x^2) + (4x + 20) \\ &= x^2(x+5) + 4(x+5) \\ &= (x+5)(x^2 + 4) \end{aligned}$$

$$\begin{aligned} 24. \text{ Factor } y^3 + 2y^2 - 9y - 18 &= (y^3 + 2y^2) - (9y + 18) \\ &= y^2(y+2) - 9(y+2) \\ &= (y+2)(y^2 - 9) \\ &= (y+2)(y-3)(y+3) \end{aligned}$$

$$\begin{aligned}
 25. \text{ Factor } k^3 - 2k^2 - 16k + 32 &= (k^3 - 2k^2) - (16k - 32) \\
 &= k^2(k - 2) - 16(k - 2) \\
 &= (k - 2)(k^2 - 16) \\
 &= (k - 2)(k - 4)(k + 4)
 \end{aligned}$$

Factoring Higher Degree Polynomials with a "Quadratic Form"

$$26. \text{ Factor } x^4 + 6x^2 + 5 = (x^2 + 1)(x^2 + 5)$$

$$\begin{aligned}
 27. \text{ Factor } p^4 - 26p^2 + 25 &= (p^2 - 1)(p^2 - 25) \\
 &= (p - 1)(p + 1)(p - 5)(p + 5)
 \end{aligned}$$

$$\begin{aligned}
 28. \text{ Factor } z^4 - 13z^2 + 36 &= (z^2 - 4)(z^2 - 9) \\
 &= (z - 2)(z + 2)(z - 3)(z + 3)
 \end{aligned}$$